

A - Introductory Comments

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Remarks begin on page 7 of this paper.

B -- Amendments to the Claims

Claims 1-15 (canceled).

Claims 16-57 (canceled).

Claim 58 (currently amended) A method of determining flow rates in a multiphase fluid flowing in a well, comprising:

- positioning an apparatus in the well, said apparatus being provided with a main body portion that automatically lies in the bottom of the well when said well ~~is~~ inclined or horizontal, the well having a longitudinal axis, the bottom of the well being defined by the bottom generator line of the inclined or horizontal well;

- providing said main body portion with a first pair of sensors, said pair comprising a speed sensor for measuring local speed of the flowing fluid and a proportion sensor for measuring local proportions of the flowing fluid;

- measuring with said first pair of sensors in the vicinity of said main body portion a first pair of measurements:

(a) ~~the local speed of the flowing fluid in the vicinity of said main body portion;~~ and

(b) ~~the local proportions of the flowing fluid in the vicinity of said main body portion;~~

- measuring in a first region of the well a second pair of measurements:

~~(i)~~(c) the local speed of the flowing fluid in a first location of the well; and

~~(ii)~~(d) the local proportions of the flowing fluid in a second location of the well, such that said first and second locations are in alignment with each other on a line parallel to the longitudinal axis of the well;

- measuring simultaneously in a second region of the well a third pair of measurements of said local speed and said local proportions, wherein the first and the second regions are in the same plane containing the longitudinal axis of the well.

Claim 59. (previously presented) A method as claimed in claim 58, wherein said first and second regions are distributed across the entire width of the well.

Claim 60. (currently amended) A method according to claim 58, wherein said plane containing the longitudinal axis of the well is oriented in a direction that is substantially vertical.

Claim 61. (currently amended) A method as claimed in claim 58, wherein the well is inclined from vertical, the method comprising measuring a second pair of local speed and local proportions of the flowing fluid in a first region lying at the bottom of the ~~vertical~~ vertically oriented plane of the well, and measuring third pairs of local speed and local proportions of the flowing fluid in second regions distributed across the entire width of the well in the ~~vertical~~ vertically oriented plane.

Claim 62. (previously presented) A method as claimed in claim 58, in which a section element (Δs_i) of the well is assigned to each region, and the overall flow rate Q of each phase is determined from the relationship:

$$Q = \sum_i q_i \cdot \frac{\Delta s_i}{S}$$

where S is the total vertical section of the well

and q_i is the flow rate of each phase in section element Δs_i ,

with $q_i = v_i \cdot h_i$

where v_i is the local speed of each phase in section element Δs_i

and h_i is the local proportion of each phase in section element Δs_i .

Claim 63. (previously presented) A method as claimed in claim 58, wherein said first and second locations are at the same point in each first and second regions.

Claim 64. (currently amended) Apparatus for determining flow rates in a multiphase fluid flowing in a well, the well having a longitudinal axis, comprising:

- a tool body to be positioned in the well, said tool body comprising:

- a main body portion that automatically lies in the bottom of the well when said well is inclined or horizontal, the bottom of the well being defined by the bottom generator line of the inclined or horizontal well; and
- at least a deployable arm that is supported by the main body portion at one end and that can be deployed from a position inside said main body portion to a position where it occupies the entire diameter of the well;
- a first sensor pair mounted on said main body portion, said first sensor pair comprising a speed sensor for measuring local speed of the flowing fluid in the vicinity of said main body portion and a proportion sensor for measuring the local proportions of the flowing fluid in the vicinity of said main body portion;
- a second and a third sensor pairs, each sensor pair comprising:
 - speed sensor mounted on the deployable arm for measuring local speed of the flowing fluid in a first location of the well; and
 - proportion sensor mounted on the deployable arm for measuring local proportions of the fluid flowing in a second location of the well;wherein said speed and proportion sensors are arranged such that said first and second locations are in alignment with each other on a line parallel to the longitudinal axis of the well;

wherein said second and third sensor pairs lie in the same plane containing the axis of the well.

Claim 65. (previously presented) Apparatus as claimed in claim 64, wherein, in use, said second and third pairs of speed and proportions sensor means are distributed across the entire width of the well.

Claim 66. (currently amended) Apparatus as claimed in claim 64, wherein when the well is inclined from vertical, said plane containing the longitudinal axis of the well is oriented

in a direction that is substantially vertical and the second pair of speed and proportions sensor means lies at the bottom of said ~~vertical~~ vertically oriented plane.

Claim 67. (currently amended) Apparatus as claimed in claim 65, further comprising a pair of speed and proportions sensor means lying at the top of the ~~vertical~~ vertically oriented plane of the well.

Claim 68. (previously presented) Apparatus as claimed in claim 64, wherein each pair of the speed sensor means and the proportions sensor means are included in multi-sensor assemblies.

Claim 69. (previously presented) Apparatus as claimed in claim 64, wherein, when the well is inclined or horizontal, the main tool body rests under the influence of gravity against the bottom of the well, and the deployable arm is applied against the top of the well.

Claim 70. (currently amended) Apparatus as claimed in claim 64, wherein, in use, the main body portion is centered about the longitudinal axis of the well by said at least one deployable arm and by a second deployable arm mounted on the main body portion, said first one and second deployable arms being capable of being applied respectively against the bottom and top of the well.